

The Very Long Base Interferometry (VLBI) Space Observatory Program combines satellite- and Earth-based radio antennas to create a larger-than-Earth telescope.

VLBI images distant quasars

By JOHN G. WATSON

Images of quasars billions of light-years away are among the striking initial results of the Very Long Base Interferometry (VLBI) Space Observatory Program, a new type of astronomy mission that uses a combination of satellite- and Earth-based radio antennas to create a telescope larger than Earth.

Initial results of the radio interferometry mission, launched in February 1997 by Japan's Institute of Space and Astronautical Science (ISAS), are reported in the Sept. 18 issue of Science magazine.

JPL is part of an international consortium of organizations that support the mission, that creates the largest astronomical "instrument" ever built—a radio telescope more than two-and-a-half times the diameter of the Earth. One of the most complex space missions ever attempted, Space VLBI has given astronomers one of their sharpest views yet of the universe.

The Science article releases four new images, all depicting quasars whose emissions are estimated to have traveled billions of years

to reach Earth. "These images probe some of the most distant and ancient objects in the universe, giving us a glimpse of quasars as they existed billions of years ago," said co-author Dr. Robert Preston, project scientist for the mission at JPL. "These powerful objects exist at the center of many galaxies, including our own familiar Milky Way, which has a weak version of a quasar."

Key results detailed in the article revolve around images of extremely distant objects created through a combination of raw data from the space radio telescope and an array of ground radio telescopes, along with highly sophisticated digital imaging techniques. Of special note is the value of such images in clearly resolving individual components in the observed quasars' jets, which are composed of material rushing away from quasars at nearly the speed of light. The four quasar images are available at <http://www.jpl.nasa.gov/releases/98/spacevlbi.html>.

Quasars are enormously bright point-like optical objects, often shining with an intensity many hundreds of times that of an entire galaxy.

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JPL computer chip to help Ford vehicles

By JOHN G. WATSON

A new computer chip that mimics how the human mind works is making its way from the space program to American industry and may end up in millions of American cars in years to come.

Computer scientists at JPL have made advanced neural network technology breakthroughs that can solve diagnostic problems in industries from automobiles and aerospace to manufacturing and electricity production.

JPL and the Ford Motor Co. have signed a licensing agreement for use of an advanced neural network technology to diagnose misfiring under the hoods of Ford automobiles, among its many potential applications. With the advent of this new chip, vehicles should show a reduction in emission levels.

The smart fit between JPL's neural net hardware and Ford's automotive engineering algorithm expertise will enhance the industrial giant's ability to meet ever-stricter Clean Air Act requirements as they apply to continuous onboard diagnostics and control, officials said.

In addition, the chip is designed to improve fuel economy, resulting in financial savings for car owners. Ford engineers do not predict a price increase for installation of the chip because JPL designed a computationally powerful neuroprocessor that could be mass-produced in a highly cost-effective way. The technology also improves customer satisfaction by virtually eliminating distracting false alarms about misfiring that vehicle dashboards can signal with current under-the-hood diagnostic technology.

JPL and Ford scientists say the chip represents the first significant change in the way computing is done on vehicles since computers were first introduced into automobiles in the 1970s.

"Neural networks are a new discipline, and diagnostics, prognostics and control is a huge field. Ford's application is but the tip of the iceberg of this chip's potential use in American industry as a whole," said Tom Hamilton, program manager at JPL's Dual-Use Technology Office, one of JPL's many technology transfer arms. "JPL is proud to be able to make this revolutionary technology available for U.S. business."

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Special Events Calendar

Ongoing

Alcoholics Anonymous—Meeting at 11:30 a.m. Mondays, Tuesdays, Thursdays (women only) and Fridays. Call Occupational Health Services at ext. 4-3319.

Codependents Anonymous—Meeting at noon every Wednesday. Call Occupational Health Services at ext. 4-3319.

Gay, Lesbian and Bisexual Support Group—Meets the first and third Fridays of the month at noon in Building 111-117. For more information, call employee assistance counselor Cynthia Cooper at ext. 4-3680 or Randy Herrera at ext. 3-0664.

Parent Support Group—Meets the fourth Tuesday of the month at noon. For location, call Jayne Dutra at ext. 4-6400.

Senior Caregivers Support Group—Meets the second and fourth Wednesdays of the month at 6:30 p.m. at the Senior Care Network, 837 S. Fair Oaks Ave., Pasadena, conference room #1. Call (626) 397-3110.

Friday, October 2

JPL Dance Club—Meeting at noon in Building 300-217.

Sunday, October 4

Chamber Music—Baritone Nmon Ford-Livene and pianist Victoria Kirsch will give a free concert at 3:30 p.m. in Caltech's Dabney Lounge. For information, call (626) 395-4652.

Tuesday, October 6

ACW Seminar—Clinical psychologist and registered nurse Dr. Bobbi Carlson will present "Assertive Communication Skills: Learning to Say No Without Feeling Guilty" at noon in the Building 167 conference room.

JPL Gamers Club—Meeting at noon in Building 301-227.

JPL Genealogy Club—Meeting at noon in Building 301-169.

"System Requirements—The Faster, Better, Cheaper Way"—

Develop New Products and the Center for Space Mission Architecture & Design will host a four-hour workshop given by Dr. Richard Stevens, chief technical officer and co-founder of Quality Systems Software. Stevens will address hardware and software requirement development, writing and management. At 12:30 p.m. in von Kármán Auditorium.

Wednesday, October 7

Associated Retirees of JPL/Caltech—Meeting at 10 a.m. at the Caltech Credit Union, 528 Foothill Blvd., La Cañada.

Chinese Language Class—Basic instruction in the language is offered starting at noon in Building 306-400. For information, e-mail to wangp@rockymt.jpl.nasa.gov.

Dr. David Baltimore Lecture—The Caltech president will discuss the life and death of cells in this free talk at 8 p.m. in the campus' Beckman Auditorium. For information, call (626) 395-4652.

Health and Safety Fair—More than 30 health care agencies will be on hand in the mall and von Kármán Auditorium to provide information and conduct health screenings, including cholesterol tests and body fat analysis. A number of vendors from JPL Safety Operations will also demonstrate their products. For more information, call Health and Safety Fair chair Susan Harper at ext. 4-3320.

JPL Drama Club—Meeting at noon in Building 301-127.

Russian Language Workshop—Meets from 7 to 9 p.m. on the Caltech campus. Some knowledge or previous study of the language is essential. For location and further information, call Joyce Wolf at ext. 4-7361.

Friday, October 9

JPL Dance Club—Meeting at noon in Building 300-217.

"Spain"—This travel film will be shown at 8 p.m. in Caltech's Beckman Auditorium. Tickets are \$9 and \$7. For information, call (626) 395-4652.

UCLA Football—Last day to purchase tickets at the ERC for the Bruins' Oct. 31 game with Stanford at the Rose Bowl. Game time is at 12:30 or 3:30 p.m. Tickets are \$18.

Tuesday, October 13

JPL Scuba Club—Meeting at noon in Building 168-427.

JPL Stamp Club—Meeting at noon in Building 183-328.

Wednesday, October 14

Associated Retirees of JPL/Caltech—Meeting at 10 a.m. at the Caltech Credit Union, 528 Foothill Blvd., La Cañada.

Chinese Language Class—Basic instruction in the language is offered starting at noon in Building 306-400. For information, e-mail to wangp@rockymt.jpl.nasa.gov.

JPL Amateur Radio Club—Meeting at noon in Building 238-543.

JPL Drama Club—Meeting at noon in Building 301-127.

JPL Toastmasters Club—Meeting at 5:30 p.m. in the Building 167 conference room. Guests welcome. For more information, contact Mary Sue O'Brien at ext. 4-5090.

Russian Language Workshop—Meets from 7 to 9 p.m. on the Caltech campus. Some knowledge or previous study of the language is essential. For location and further information, call Joyce Wolf at ext. 4-7361.

SESPD Lecture Series—Mars Mobile Science Laboratory Manager Barry Goldstein will discuss the Athena Project at 11 a.m. in Building 180-101.

Thursday, October 15

JPL Astronomy Club—Meeting at noon in Building 198-102.

Von Kármán Lecture Series—Stardust Project Manager Dr. Ken Atkins will speak at 7 p.m. in von Kármán Auditorium. Open to the public.

Friday, October 16

JPL Dance Club—Meeting at noon in Building 300-217.

Von Kármán Lecture Series—Stardust Project Manager Dr. Ken Atkins will speak at 7 p.m. in the Forum at Pasadena City College, 1570 E. Colorado Blvd. Open to the public.

Flu shots this month

Influenza vaccine is strongly recommended for any person who, because of age or underlying medical condition, is at increased risk for the complications of influenza. In addition, the vaccine may be administered to any person who wishes to reduce the chance of becoming infected with influenza, said Occupational Health Services Manager Dr. Donal Sweeney.

The vaccine will be available at JPL beginning Oct. 15 at Occupational Health Services, Building 263. The vaccine will be provided in a series of clinics on Thursdays and Fridays, 1:30 p.m. to 3 p.m. Appointments will not be given, and shots will be administered on a first-come, first-served basis.

Sweeney noted that flu shots have recently been found to be beneficial in healthy, working adults. A study in the New England Journal of Medicine found vaccinated individuals had 25 percent fewer upper respiratory illnesses. The study also found a \$47 per person savings in health-care and related costs. This savings is even greater when the vaccine is provided at the worksite, where consideration for work time lost for vaccination would be eliminated.

Weekly schedules, including exceptions and changes, will be advertised on JPL monitors and posted to the jpl.forum newsgroup. For descriptions of high-risk groups and other information, check Occupational Health Services' home page at <http://eis/medical>. □

Lab helps National Geographic provide maps to schools

Every school in United States set to receive gift this month

By JOHN G. WATSON

The National Geographic Society is providing a gift to America's children by sending every school in the United States a large, laminated, updated map of the world. Space program technology from JPL played a pivotal role in the creation of the satellite map images.

Each of the nation's more than 100,000 public and private schools will receive the two-sided map within the next four weeks.

One side of the 1.2- by 1.8-meter (4- by 6-foot) map shows the political world as of June 1998; the other side is a digital image of the physical world based on images collected by satellite. The latter was made possible in part through JPL's digital imaging expertise, which helped create a seamless physical world map out of more than 500 separate images. To do so, JPL drew upon its decades of unique experience in the enhancement and production of images of other worlds sent back by spacecraft from throughout the solar system.

Cartographers at National Geographic Maps relied in large part on a JPL team led by Dr. Nevin Bryant of the Laboratory's Cartographic Applications Group for guidance on working with digital data in order to create the satellite map of the world.

The partnership between the National Geographic Society and JPL was facilitated through JPL's Technology Affiliates Program, one of the Lab's several technology transfer arms. This program is specially designed to



JPL technology helped to create the above map of the world, which will be given to every U.S. school.

help American businesses and other institutions utilize the knowledge and skills of the space program's scientists and engineers.

"This relationship shows how well federal research can be leveraged for the public as well as science," said Merle McKenzie, manager of JPL's Commercial Technology Transfer/Regional Development Program.

"In the closing decade of this century, entire countries have come or gone, boundaries have

shifted and place names have changed," said National Geographic Society President John Fahey.

"What better way to start the new millennium than to make sure every one of our nation's schools is on the same map?"

The National Geographic Society is the world's largest nonprofit scientific and educational organization, with 10 million members worldwide.

For information on buying the map (\$39.95, order number M8I22001C), call (800) 368-2728. □

TOPEX image shows Pacific running both hot and cold

La Niña development still uncertain

By MARY HARDIN

The lingering El Niño in the Pacific Ocean still appears locked in a battle with a possibly waning La Niña condition, according to scientists studying new measurements of sea surface height made by the JPL-managed TOPEX/Poseidon satellite.

The new image shows that the rapid cooling that had occurred in the central tropical Pacific has slowed and the area of low sea level, or cold water that is sometimes referred to as La Niña, has slightly decreased in size and strength since August.

See TOPEX, page 6

It is still uncertain, scientists say, that this cold pool will evolve into a long-lasting La Niña situation.

The image shows sea-surface height on Sept. 12 relative to normal ocean conditions. Sea surface height is an indicator of the heat content of the ocean; the pool of cold water in the Pacific is detected by the satellite as a region of lower than normal sea level.

The tropical Pacific Ocean continues to exhibit the complicated characteristics of both a lingering El Niño, and a possibly waning La Niña situation. The coexistence of these two contrasting conditions indicates that the ocean and the climate system remain in transition. These strong patterns have remained in the climate system for many months and will continue to influence weather conditions around the world in the coming fall and winter.

A La Niña is essentially the opposite of an El Niño condition, but during a La Niña the trade winds are stronger than normal and the cold water that normally exists along the coast of South America extends to the central equatorial Pacific. Like El Niño, a La Niña situation also changes global weather patterns, and is associated with less moisture in the air resulting in less rain along the west coasts of North and South America.

The Sept. 12 image is available online at <http://www.jpl.nasa.gov/elnino>. □

NBS goes 'live' Oct. 8

By MARK WHALEN

Thanks to the diligent work of JPL's New Business Solutions Project over the last 22 months, the Laboratory is now in receipt of a new set of automated and integrated business processes to prepare it for the new millennium.

The New Business Solutions Program has now delivered New Business Systems (NBS), an integrated set of 42 business applications to support the Laboratory. Just in time for the beginning of fiscal year 1999, IBS is set to go "live" Oct. 8, said New Business Solutions Manager Marc Montgomery.

"The foundation of the automated-tools implementation," Montgomery said, "is 10 Oracle business applications, configured by the NBS team to specifically support JPL's business processes. The system will cover every aspect of purchasing, accounting, inventory and more."

In addition, 11 new applications were cus-

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News Briefs

Mark Bennett has been named JPL's new benefits supervisor.

Previously, Bennett worked for 13 years as vice president and retirement plan administrator at Home Savings of America. In this capacity, he was responsible for managing the staff and overall operations of Home Savings' pension, 401(k) and executive benefit programs. He has also worked in the company's compensation, affirmative action and employee relations departments.

Bennett holds bachelor's and master's degrees from Loyola Marymount University.

Former benefits supervisor **Melinda Stell** will continue her work with the New Business Solutions (NBS) Project in anticipation of the implementation of the human resources/payroll modules in January. □

Izeller Cureton-Snead has been appointed the Human Resources Directorate's technology integration leader. In her new capacity, she will lead NBS' payroll, human resources and time-keeping rollout in January 1999 and will facilitate the integration of ongoing technology applications within Human Resources.

A 20-year veteran of JPL, Cureton-Snead has worked on numerous tasks and projects within the Engineering and Science Directorate and Telecommunications and Mission Operations Directorate. Since January 1997 she has worked on the NBS team as the application architecture engineer and most recently served as timekeeping technical manager. □

The Mars Pathfinder Project has been selected as the winner of the 1998 project of the year award by the Project Management Institute, a leading nonprofit professional association in the area of project management.

The award will be presented Oct. 13 at the organization's symposium in Long Beach.

The institute, with about 40,000 members worldwide, establishes project management standards and provides seminars, educational

programs and professional certification. □

For his achievement in leading the design and development of Pathfinder's airbag subsystem, cognizant engineer **Tom Rivellini** has been named the American Institute of Aeronautics and Astronautics engineer of the year.

Rivellini received the award in late September at the AIAA's World Aviation Congress and Exhibition in Anaheim. The organization is the largest professional technical society devoted to the progress of engineering and science in aviation in space. □

A JPL subcontract closeout team has been honored for its work in streamlining cross-organizational automated workflow.

JetForm Corp. of Ottawa, Canada, which produces enterprise workflow and electronic forms automation products, named JPL the gold medalist in its excellence awards' innovation category. The awards honor JetForm customers that have created solutions with its products in a creative manner to solve complex problems.

JPL was recognized for its application combining electronic forms and workflow to automate a cumbersome, paper-intensive process of closing out subcontractor contracts. The automation of this process involves many organizations, including Acquisitions, Contract Audit, Subcontract Property, Office of Patents, New Technology, and Security. Automation of this process has increased operational efficiencies (especially through the use of reminders and deadlines), reduced paper and duplication of effort, shortened the closeout process, and improved subcontractor satisfaction.

Team leader **Francine Fisher** of the Acquisition Support And Information Section 623 received the award Sept. 15. □

NASA's recent recognition of three minority contractors for their exceptional contributions to the nation's space program includes honors for a Southern California contractor that

has aided a number of JPL missions.

Stanford Mu Corp. of Harbor City received a minority subcontractor award for designing and developing special pressure regulator components for the Cassini spacecraft's propulsion module subsystem; Mars Global Surveyor; the Mars Surveyor 1998 Mars Climate Orbiter and Mars Polar Lander.

Lockheed Martin Astronautics of Denver nominated the six-year-old corporation for the honor. Awards are given annually to minority contractors and subcontractors who have demonstrated significant support of NASA's initiatives.

Honors were presented to the three companies Sept. 23 at NASA Headquarters. □

The Office of the JPL Ombudsperson has expanded its web site to include a section called "An Open Eye," which contains broad observations from the Ombudsperson that may be of interest to the JPL community. It will be updated every six to eight weeks.

The web site is located at <http://jpl-ombuds>. □

Dr. Eberhardt Rehtin, known as the father of the Deep Space Network, will receive the Caltech Management Association's Excellence in Management Award Oct. 22 at Caltech's Athenaeum.

Rehtin, recognized for pioneering and advancing powerful technologies that continue to serve the nation as the basis for the design of complex engineering and management systems, will also deliver a talk titled "Why Eagles Can't Swim." Rehtin employs this metaphor, along with examples from the telecommunications, space and power industries, to address the complex matter of using systems architecting to discover what excellent organizations can and cannot do.

Reservations for Caltech Management Association members and guests are \$32; with \$42 for nonmembers. Cocktails are at 6 p.m., with dinner at 7:00 and program at 8:15.

For information, contact Alfred Paiz at ext. 4-2232, or cma.announce@jpl.nasa.gov. Make check payable to Caltech Management Association and send to **Janester Short**, Caltech mail code 405-47. Reservation deadline is Oct. 15. □

Product delivery system manual goes to ISO auditor

By **KERRY LYN CASSIDY**
ISO 9001 Implementation Team

JPL's ISO 9001 effort has begun to take some important steps toward eventual registration in March 1999.

The Lab's product delivery system manual was delivered to a third-party auditor on Monday, Sept. 28. The manual is used to describe how JPL's processes implement the ISO 9001 standard. The product delivery system is a method for maintaining a high level of quality and intended performance of JPL's products over time and for the future. The manual includes product delivery system require-

ments and has supporting documentation (policies and procedures consistent with the requirements of JPL element policies). A description of the element policies can be found on the Institutional Environment navigator at <http://dmie.jpl.nasa.gov>.

The third-party audit is held to verify—based on a sampling method—that JPL's product delivery system (also known as quality system) conforms to ISO 9001 requirements. Specifically, the purposes of the third-party audit are to:

- Determine whether JPL's product delivery system conforms to ISO element requirements;
- Determine the effectiveness of the product delivery system in meeting JPL quality objectives;
- Provide JPL with an opportunity to improve the product delivery system.

After reviewing the product delivery manual, the auditing team will issue a report with

their findings. A site visit is then scheduled for Oct. 15.

Several ISO-related communication tools are being introduced to the Lab in the following weeks:

- An ISO badge containing the JPL quality policy, as well as emergency and other useful Labwide phone numbers, is being distributed by Security as part of the rebadging process;
- A quality-policy poster designed by Stephen Brewster from Outer Planets/Solar Probe Project/Ice and Fire Missions will be made available to all organizations and projects;
- Videotapes of an ISO 9001 presentation by Jerry Suitor and Richard Brace will be distributed to all divisions for viewing by section, group or individual in order to familiarize the Lab with the implementation process being followed in order to get the Lab registered by March 1999. □

Sidewalk astronomer hits Old Town

By MARY BETH MURRILL

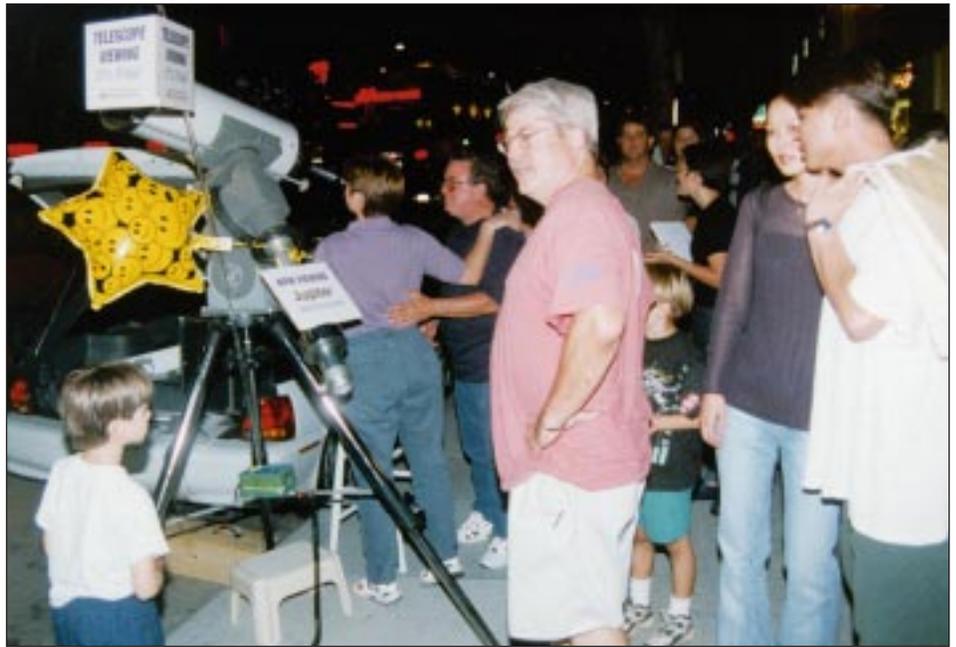
He hits the downtown streets in darkness, and he's on a mission.

Armed with a telescope, tripod and star charts, "sidewalk astronomer" Dave Doody of JPL set out into night in Pasadena's Old Town Saturday, Sept. 19 to bring the planets to the people.

It was the second time in two weeks that Doody, a flight operations engineer on the Cassini mission, had volunteered his time as a street astronomer as a member of JPL's Amateur Astronomy Club, which has the telescope on loan from the Lab's Telescopes In Education project.

When he set up a 200-millimeter-diameter (8-inch) Tinsley telescope on the streets of Pasadena the first weekend in September, Doody said that a line of people stretched halfway down the block, and more than 900 were able to view Jupiter and some of its moons over the course of the evening. "People offered money to look, but of course it's free-of-charge," he said.

Doody said that most of the people he meets on his urban skywatching adventures have never



Old Town visitors line up to view the heavens through the telescope brought by Dave Doody, center.

before looked at the heavens through a telescope. "When people look at a little dot in the sky with their naked eye, then see it through the telescope, they see why it's so fascinating and why you want to send a spacecraft to it to study it close-up," he said. "Most people are astounded."

A former instructor for Japan Airlines pilots

who has also worked as a systems engineer on Santa Catalina Island, Doody is the co-author of "The Basics of Space Flight," a popular web site on JPL's home page. His articles also appear occasionally in popular magazines.

Doody said he plans on setting up further telescope observations from Old Town next year. □

Ford

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The licensing agreement comes on the heels of a less formal Technology Cooperation Agreement that had existed between JPL and Ford since 1993. Under terms of that agreement, JPL and Ford engineers worked cooperatively to refine applications of the emerging technology to Ford's specific needs.

The new license provides Ford with rights to intellectual property of the chip for auto industry applications, while JPL, which has applied for patents to the technology, retains general rights. JPL is managed by Caltech, which serves as the party of record for this license.

The Ford deal is a good example of how JPL technologists can benefit financially as a result of their work that has commercial potential, said Merle McKenzie, manager of JPL's Commercial Technology Program.

In the case of royalty income, inventors may choose to receive as personal income 25 percent of the gross royalties generated from their licensed technologies.

When Caltech elects to take an equity position in a company, the inventor can also receive 25 percent of the stock value held by Caltech. The first step in the process, she said, is filing a New Technology Report with the Lab's Technology and Reporting Team so Caltech can assess the work's commercial potential. In the specific case of the neural chip, that potential has begun to be realized with Ford.

Neural systems were inspired by the architecture of nervous systems of animals, which use

neurons, a form of parallel processing elements, to process large volumes of information simultaneously. In vehicle applications, artificial neural networks will "learn" both how to diagnose problems like engine misfires and control the engine to optimize fuel economy and emissions.

"What JPL has brought to the table is expertise in designing and building what are known as neural network 'application-specific integrated circuits,'" said Dr. Raoul Tawel, who led the development at JPL for the chip. "With Ford, we are implementing highly complex neural network software code in dedicated hardware logic. This brings about a tremendous boost in computational ability compared to traditional software-based approaches, enabling real-time onboard diagnostics for the first time."

For misfire diagnostics, it is necessary to observe and diagnose every engine firing event, estimated at more than 1 billion in the life of each car.

In addition, the diagnostic error rate has to be extremely small, less than one in a million, in order to avoid sending false alarm signals to the driver. The new chip will accomplish that task by "learning" diagnostic tasks during the vehicle development process, bypassing the need to develop conventional software that, in any event, can neither perform these tasks as well nor be implemented in large production volumes with standard microprocessors. The neural network chip, designed to carry out parallel neuron computations efficiently, overcomes the computational barriers that prevent this technology from being exploited today.

A detailed, technical explanation of the technology written by Tawel and Nazeeh

Aranki of JPL and Drs. Ken Marko and Lee Feldkamp of Ford's neural network team, among several others, is available on the web. "Custom VLSI ASIC for Automotive Applications with Recurrent Networks" can be accessed at <http://www.jpl.nasa.gov/releases/98/ijcnn98.pdf>.

For further information about JPL's technology transfer programs, visit <http://techtrans.jpl.nasa.gov/tu.html>. □

NASA, Caltech sign new contract to operate JPL

Caltech has entered into a new five-year contract with NASA to continue managing JPL as a federally funded research and development center through the year 2003.

"JPL has always been a unique institution combining the talents of the academic and government aerospace communities," said Caltech President Dr. David Baltimore. "We believe the synergy enriches both the Caltech campus and NASA."

"This contract allows Caltech and NASA to continue their long working relationship at a particularly exciting time when JPL is preparing a great variety of new missions to explore the solar system, Earth and the universe," said JPL Director Dr. Edward Stone.

The estimated annual value of the cost-plus-award-fee contract is \$1.25 billion, for an estimated total value of \$6.25 billion over the life of the contract. □

NBS

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tom-designed for JPL. Of these, employees are now familiar with the recently developed online timekeeping system. Fourteen existing applications were also integrated with the system, including Just In Time, Perform and the purchase card system.

Budgeting applications have been available for awhile for projects to do their fiscal year 1999 planning. Human resources and payroll modules will be rolled out to end users in January. "The beginning of the calendar year is a great time for us to bring up the new payroll module," Montgomery said, "because the reporting for payroll is then in sync with everyone's W2 going out."

At the same time, he said, the signing of the new NASA/Caltech contract for the operation of JPL "is also a good time for us to begin a new system and collect our financial data in an improved way."

Using the Oracle approach, every project on Lab will set up their budgets and track data in a new way.

In addition, all those who work in JPL business operations will be affected, Montgomery said. "Most of the tools they're familiar with are going to be replaced. A good example is purchasing. The processes are similar to what they have been. But by providing them with new tools, I think they're going to have a significant advantage in being able to share the same data with other people key in the process."

New Business Solutions was first chartered, Montgomery said, to reengineer the Lab's business processes to help meet its challenges of more frequent missions with quicker turnaround times. He cited an example of the challenge.

"From the beginning of the project, we treated an acquisition as a complete process, starting when someone wants to purchase something, through the placement of the order, receipt, delivery to end user, payment for it and then the closeout. We've put the tools in place that allow all the people who have a role in that process to work much more closely together. That's going to improve our efficiency significantly."



"Our process redesign, to a great extent, is intended to push out to the using community the authority and responsibility to do a lot more of the business functions that they've not been doing in the past," Montgomery said. "It's now up to the resource administrators to create accounting structure for projects, to open and close the projects and tasks. There's no more need to go

through a financial controls organization. We've taken the middleman out of the equation."

To coincide with the rollout, old JPL account codes are being replaced with new Oracle project/task numbers for all financial transactions. Employees should check for new project/task numbers at <http://nbs-web>.

Preparing new users for the automated systems has been a daunting task, as more than 1,000 computers and peripheral machines are being set up.

Training on the new systems has included a series of workshops and classes on—among others—acquisition, services administration, asset management, project accounting and budgeting, contract audit, accounts payable, funds administration and timekeeping.

Long-term training will continue with getting new employees up to date, as well as those taking on new tasks in new jobs on Lab.

Montgomery also noted IBS' customer support center, an integrated effort with OAO. Those in need should call ext. 4-HELP (4-4357) for questions or problems on Oracle applications. The NBS home page at <http://eis.nbs> will offer a number of resources to help users, including a link to the IBS customer support home page.

JPL's rollout is one of the largest implementations of Oracle software in the United States in terms of the number of modules unleashed at one time. "Other companies using Oracle phase them in, for the most part," Montgomery said, "but JPL has decided to go with the 'big bang' approach to develop it all together and bring up at one time." □

VLBI

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It is believed that quasars are powered by gas and the remnants of stars spiraling into black holes that have masses of millions to billions of times that of our Sun. Black holes are objects that are so massive that no light or matter can escape from them. Some of the material rushing into the black hole is thought to be thrown away at enormous speeds to form the observed narrow, radio-emitting jets. By studying these jets, astronomers hope to learn more about the black holes that power them.

Very long baseline interferometry is a technique used by radio astronomers that electronically links widely separated radio telescopes together to form a single instrument with extraordinarily sharp "vision," or resolving power. The wider the distance between the telescopes, the greater the resolving power.

By taking this technique into space for the first time, astronomers have approximately tripled the resolving power previously available with only ground-based telescopes. The Space VLBI satellite system has resolving power more than 100 times greater than the Hubble Space Telescope has at optical wavelengths. In fact, its resolving power is almost equivalent to being able to see a grain of rice in Tokyo from Los Angeles.

The project, a major international undertaking, is led by Japan's ISAS, backed by the National Astronomical Observatory of Japan.

Collaborators include JPL; the National Science Foundation's National Radio Astronomy Observatory (NRAO); the Canadian Space Agency; the Australia Telescope National Facility; the European VLBI Network and the Joint Institute for Very Long Baseline Interferometry in Europe. More than 50 scientists associated with these and other collaborating institutions contributed to report published in Science magazine overview paper.

The Space VLBI project's eight-meter-diameter (26-foot) orbiting radio telescope observes celestial radio sources in concert with a number of the world's ground-based radio telescopes. It is in an elliptical orbit, varying between 1,000 and 20,000 kilometers (620 to 12,400 miles) above the Earth's surface. This orbit provides a wide range of distances between the satellite and ground-based telescopes, which is important for producing a high-quality image of the radio source being observed. One orbit of the Earth takes about six hours.

Approximately 40 radio telescopes from more than 15 countries have committed time to co-observe with the satellite. These telescopes include NASA's Deep Space Network antennas in California, Spain, and Australia; the National Science Foundation's Very Long Baseline Array (VLBA), an array of 10 telescopes spanning the United States from Hawaii to Saint Croix; the European VLBI Network, more than a dozen telescopes ranging from the United Kingdom to China; a Southern Hemisphere array of telescopes stretching from eastern Australia to South Africa; and Japan's network of domestic radio telescopes. □

Retirees

The following employees retired in October:

William Demore, 42 years, Section 323; **Lloyd Adams**, 38 years, Section 387; **Frank Barath**, 38 years, Section 700; **Robert Blakely Jr.**, 37 years, Section 334; **Fred Friedlander Jr.**, 37 years, Section 643; **John Carnakis**, 36 years, Section 314; **Anthony Giandomenico**, 36 years, Section 352; **Robert Howick**, 36 years, Section 662; **Bruce Gary**, 34 years, Section 386; **Rudolph Russ Jr.**, 34 years, Section 662; **Henry Houze**, 31 years, Section 662; **Robert Ewing**, 29 years, Section 662; **Robert Phen**, 29 years, Section 872; **Fred Sanders**, 27 years, Section 601; **Daniel Taylor**, 26 years, Section 353; **Lester Oien**, 25 years, Section 662; **Kenneth Beutler**, 24 years, Section 662; **Carl Hallstrom**, 24 years, Section 662; **John Griffin**, 23 years, Section 662; **Richard MacGillivray**, 23 years, Section 662; **Theodore Clarke**, 22 years, Section 314; **William Neibert**, 21 years, Section 662; **George Stephan**, 21 years, Section 391; **Louis Trabbie**, 21 years, Section 662; **Sam Jacoby**, 19 years, Section 662; **Richard Neill**, 19 years, Section 662; **Rodolpho De Vera**, 18 years, Section 662; **Albert Thibodeau**, 18 years, Section 662; **Armando Marquez**, 15 years, Section 662; **Fernando Mina**, 15 years, Section 662; **Hyder Ali**, 14 years, Section 940; **Salvator Vasta**, 14 years, Section 662; **Richard Welsh**, 14 years, Section 662; **Joseph Novelli**, 12 years, Section 662; **Ted Ortiz**, 12 years, Section 662; **Arturo Lopez**, 11 years, Section 662; **Sun Kang Kwan**, 10 years, Section 662. □

Benefits enrollment starts Oct. 19

The annual enrollment for JPL employee benefits takes place from Oct. 19 to 30. Employees may update dependent information, change medical or dental carriers or renew annual spending accounts at this time.

Employees are again being offered the convenience of a telephone enrollment system for benefits changes. Phone lines will be open seven days a week, 24 hours a day during the enrollment period. All employees will soon receive a personalized enrollment package mailed to their home.

Those participating in health care or dependent care spending accounts are required to enroll annually and must call the telephone enrollment system with their new 1999 contribution amount.

For more information on Caltech benefit plans, the benefits handbook or annual enrollment, access the benefits web site at eis/hr/benefits/benefits.htm.

Passings

Dilworth Prisbrey, 69, a retired member of the technical staff in Section 352, died of kidney failure Aug. 28 at Verdugo Hospital in Glendale.

Prisbrey joined JPL in 1963 and retired in 1994. He is survived by his wife, Donna; sons Michael, Richard, Gary and Douglas; 14 grandchildren and three great grandchildren.

Services were held in Brigham City, Utah. □

James Spaulding, 75, a retired member of the Laboratory's technical staff, died of pulmonary disease Sept. 15 at his home in

Health and dental plan representatives will be available Oct. 20 and 22 in the Building 167 cafeteria between 10 a.m. and 2 p.m. to answer questions. □

Arlington, Va.

Spaulding worked at JPL from 1966-87. He is survived by his wife, Sandra.

No services were held. □

Henry Moore, 70, a U.S. Geological Survey geologist who helped select the landing sites for the Viking and Pathfinder missions to Mars, died of a heart attack Sept. 21 in Utah.

Moore also trained Apollo astronauts in geology prior to their moon landings and served on the Pathfinder science team to interpret photos and other data sent to Earth by the Sojourner rover. He is survived by his wife, Patsy Ann; two sons and a daughter. □

LETTERS

My family and I would like to thank the people of the Environmental Test Lab, the staff of Section 351 and the ERC for their thoughtfulness following the death of my mother.

Geoff Laugen

□□□

Our sincere thanks to the ERC for the lush green ficus plant sent to us on the death of our beloved husband and father, Thomas H. Bickler.

Marjorie Bickler, Thomas C. Bickler, Dawn Bent

□□□

My family and I would like to thank all our friends at JPL for their kind expressions of sympathy on the passing of my mother.

Bob Gershman

□□□

Thank you to all who came to my retirement party and for the great gifts. Also, thanks to all those who couldn't come to the party but stopped by or called to say goodbye. And a special thanks to Thedra McMillian for arranging the party and for many years of friendship and support. In our day-to-day work we sometimes forget what a special place JPL is but retirement highlights how unique and exceptional it is. JPL people make it that way, and I feel privileged to have worked with so many outstanding people. Thank you all for the opportunities I've had to work with you.

Bob Phen

FOR SALE

BABY ITEMS: crib and mattress \$100; chest of drawers & changer \$150; car seat/carrier \$50; other items at reasonable price; all in vg condition. 248-8853.

BABY/TODDLER ITEMS: Pine crib (like new) with bedding and bumpers (\$150); colorful walk-in playhouse (\$50); toddler picnic table and bench set (\$30); baby stroller, reclines for sleeping (\$75); changing table/chest of drawers (\$75). 626/355-6573.

BED FRAME, king size, never used, \$30/obo. 626/568-8298.

BEDROOM FURNITURE: desk, nightstand, bureau with mirror, all white with gold trim, gd. condition, \$150/obo for the set, will negotiate for individual pieces. 626/797-6453, Nancy.

BEDROOM SET, woodgrain (brown) laminated corner group; corner desk, chair, cabinet with drawer, 3-drawer dresser; perfect for a spare bedroom or teenager's room, vg cond., \$125/obo. 626/337-7522.

BEDS/MATRESSES, twin & king sz.; KITCHEN TABLE + 4 chairs. 626/791-2434.

BICYCLE, 43cm Landshark, Reynolds 853 tubest; 8-speed Shimano Ultegra, 650c wheels, exc. condition; \$1,500/obo. 626/793-6504.

BICYCLE, 52cm Simonetti, Easton Elite tubest; 8-speed Shimano Dura-Ace group, 700c wheels; exc. condition; \$1,300/obo. 626/793-6504.

BIKE, tandem beach cruiser, exc. cond., gel seats, \$250/obo. 626/357-2741.

CHAIRS (4), ladderback, wicker seats, Early American style; \$30 ea. 626/351-9340.

CHILD CARRIER SEAT for bicycle, Rhode Gear, \$35; Rhode Gear rear rack, \$10. 626/351-9340.

COFFEE TABLE, white marble, 23" x 69", \$120. 626/797-6982.

COMPUTER, Apple PowerBook 160, \$150/obo; PRINTER, HP DeskWriter, \$70/obo; TECHNICAL BOOKS, mostly engineering, 240-7253.

COMPUTER, Mac SE with ImageWriter printer and accessories,

HD not working, \$30. 805/250-0456.

COMPUTER, Macintosh Centris 650, 32MB RAM, 230MB HD, internal CD drive, external SupraFAX modem 28.8, manuals, CD ROMs and OS 7.1., \$700. 909/845-5807.

COMPUTER STAND, pullout drawer for mouse/keyboard, lower pullout shelf for printer, \$25/obo; PRINTER STANDS, beige or gray, \$15/ea./obo. 352-9957.

COMPUTER SYSTEM: Apple PowerMac 7200/90/4XCD w/500MB hard drive, 64MB RAM, 4MB VRAM, 512k Level 2 cache; AppleVision 1710 17" Trinitron monitor, keyboard, mouse, and Global Village 56k X2 modem (upgraded to v.90); \$1,400/obo. 626/793-6504.

CRIB, Evenflo "Happy Camper" portable, incl. carrying case; \$25. 626/351-9340.

DARKROOM EQUIPMENT, Vivitar E-36 enlarger, loader, timer, light, filters, misc., \$200/obo. 626/398-3381, Bruce, eves.

DOG, pure breed AKC registered English beagle puppies, \$350/ea. with papers, 626/964-3873, Andy or Lila.

DOG, AKC Rottweiler puppies (5 male); born 7/27/98, with papers, first shots and dewormed. 909/592-5040, Kim or Ralph. DRESSER, two units, oak, 5 drawers each, excellent condition, 36" w x 46.5" h x 17" d; \$150/ea., both for \$250/obo. 626/568-8298.

ENTERTAINMENT CENTER, solid oak, 65" W x 75" H, exc. cond., \$500. 909/593-4991.

ESTATE/RUMMAGE SALE, Sat., Oct. 3, 9 a.m. - 3 p.m. and Oct. 4, 9 - noon, Arcadia Elks Lodge, 27 W. Huntington Dr., rear parking; jewelry, clothing for entire family, kitchen items, books, other misc. items; sponsored by Arcadia Elks Ladies Auxiliaries, all proceeds donated to disabled children in Calif. and Hawaii.

ESTATE/RUMMAGE SALE, Sat., Oct. 3, 8 a.m. - 3 p.m., 2062 E. Washington Blvd., (betw. Allen/ Altadena Dr.), Pasadena; old items, clothes, furniture, toys and other misc. items.

EXERCISE BIKE, Schwinn, odometer cable broken but still works, \$20/obo. 626/573-2564.

FILE CABINETS (4), metal, 4-drawer, legal/letter, beige enamel, \$30/ea., one or all. 352-9957.

GARAGE SALE, Oct. 3, many baby items: crib & matr., \$80; playpen, \$50; high chair, \$50; other items at reasonable prices; 749 N. Mar Vista, Pasadena. 626/798-1839.

HOCKEY TICKETS, individual games for L.A. Kings; Colonnade on blue line; 2 aisle seats with Forum parking; \$60 for all (\$87 face value). 626/331-9998.

MOVING SALE: complete set of 160 moving boxes, \$150; antique mission-style oak bed with extra long double mattress, \$200; antique oak dresser with mirror, \$200; new oak youth bed with mattress, \$100; oak wall unit (entertainment center), \$75; small oak hi-fi cabinet on casters with glass doors, \$80; large oak computer desk with hutch, \$90; 6 x 9 area rugs (rose/brown oriental), \$40 each. 790-1279, eves.

ORGAN, Yamaha 415 electronic console w/13 pedals, 3 keyboards, 144 rhythm patterns, pd. \$7,500, sacrifice for \$3,000. 790-3899.

OVEN/MICROWAVE combination, Thermador, self-cleaning, in orig. crate, like new, \$300/obo. 352-9957.

PERSONAL INFORMATION MANAGER, Seiko "Phone-Pal", \$25. 790-3899.

PIANO, Kimball, prime cond., Fr. provincial styling, dk. walnut finish, velvet padded bench, may need tuning. 790-1838, eves.

POWER CENTER, \$15. 790-3899.

RECORDING STUDIO, Foster 8-track, low hours, 12-channel, 8-bus console, power amp & effects included, \$1,250.

626/791-2700.

SHOES, ladies Avia cross-training, 7W, bought 9/98, too tight, regular \$49, sell \$16/obo. 626/573-2564, Mary.

SOFA, 8' white Damask, \$100; STEREO CABINET/SPEAKERS, \$200; MICROWAVE, 1.5 cu. ft., \$30; BED, full-sz. w/frame, \$100; TV, Sony 25" color, \$75; VCR, RCA, \$25. 949/673-3353.

SOFTWARE for Mac, all \$25 and under. 790-3899.

SOFTWARE, Windows, never used: Win 95 w/Fat 32 (\$59), Office 97 CD tutorial (\$10), Word 97 upgrade (\$25), full version Word 97 (\$49), entire WordPerfect Suite 7.0 (\$25), Print Studio Window Draw Premier with 33,000 clip art bonus software (\$25), Adobe Photodelux (\$25), IBM Via Voice (\$19), Windows 95 tutorial (\$10), New Snappy 3.0 Video Capture, never used, (\$69), Decent 2 (\$10), deluxe typing tutorial (\$9), Compton's New Century CD Encyclopedia (\$9) and HP gold blank recordable CDR (\$4). 626/335-4409.

SPORTS COINS, box of '88 Topps, 36 unopened packs, incl. McGwire, Ryan, Sutton; MAGAZINES, '54 and '55 National Geographic, exc. cond., various months, \$5/ea. 626/914-6083.

SPRINKLER VALVE ACTUATOR, Lawn Genie automatic, new, model 756LG 3/4", \$10/each. 790-3899.

STATIONARY BICYCLE, has pulse monitor, magazine rack, programmed exercise routines, or manual tension levels, \$300. 790-3854.

STOVE, Thermador cook-top, stainless steel, w/center grill/griddle, in orig. box, like new, \$200/obo. 352-9957.

SWEATER, Coogi, from Australia, size small/medium, new, sells for \$325 in Nordstrom; \$100. 790-3899.

TABLE, dining room, round, mahogany; sits 8 w/2 extensions; almost new; comes w/6 matching chairs; \$700/obo. 626/568-8298.

TABLE, dining room, elegant, 6' x 4'; 1" beveled leaded glass, with leaded glass and brass V-shaped pedestals; & 4 high-backed black chrome & brocade chairs; excellent condition; all for \$600/obo. 951-9635.

TAPE RECORDER, TEAC A2340 reel-to-reel with TEAC 6-channel audio mixer, \$200/obo. 805/250-0456.

TENT, cabin, 9 x 11, 80" high, freestanding, sleeps 6, gd. cond., \$60. 626/797-6982.

TREADMILL, Jane Fonda model with cassette player, exercise tape; fits under bed; barely used; cost \$300; sell \$150/obo. 626/797-3156.

VIOLIN, 1/2 sz., gd. for elem. student, gd. cond., \$75. 909/591-3312.

WINDOW SHUTTERS, wood, interior, painted white, 14 3/4" wide x 67" high, 4 avail., exc. cond., \$25/obo for all 4. 626/791-7645.

YARD SALE, Oct. 3, 8:00-4:00; appliances, baby items, Little Tykes; 3737 Burrill Way, La Crescenta.

VEHICLES / ACCESSORIES

'91 ACURA Legend LS, white with blue int., automatic, loaded, 74,000 miles, new Michelin tires, mint cond., \$13,500. 626/358-8648.

'96 BMW 328i, black, loaded, exc. cond., sports pkg., 5-spd., a/c sunroof, leather, 6-CD changer, keyless entry, 38K mi., 50K mi. fact. warr., \$28,000/obo. 957-7243.

CAMPER SHELL, fits '84-'88 Toyota Extra Cab pickup truck, sliding front/side windows, off-white, \$400/obo. 626/793-6504.

Continued on page 8

'74 CHEVROLET, 178,078 mi., 36,036 on rebuilt eng. & rebuilt auto trans., 350 V-8, 3/4 ton, exc. cond., maintenance records, air cond., pwr. steering, pwr. brakes, front disk brakes, 8-ft. bed, bedliner, cargo box, towing pkg., new paint, am/fm cass., custom wheels, custom running boards, dual fuel tanks, \$3,100. 805/527-6834.

'75 DATSUN 280Z, exc. cond., interior restored, new injectors & Seabring exhaust, 64,000 orig. mi., \$2,700. 626/791-2700.

'72 DATSUN 240Z, rare model, auto, vinyl top, 1 owner, orig. paint, interior restored, dual Webber carbs, Dynomax exhaust, rebuilt from ground up, a true classic, Book \$9,500; sell \$4,500/obo. 626/791-2700.

'96 DODGE Grand Caravan SE, 3.3 V6 eng., white, 7-passenger, 2 sliding doors, rear a/c, 2 alarms, 34,500 mi., exc. cond., \$18,500/obo. 626/798-9941, lv. msg.

'84 DODGE D-50 pickup truck, vg cond., auto, 2.6 eng., tilt wheel, bedliner, shell, very clean, well-maintained, 137K mi., just smogged, orig. owner, \$3,000/obo. 626/332-2682.

'96 FORD Contour SE, blk/grey, 32,000+, tinted windows, 4-dr, 5-spd, a/c, power windows/locks, child safety, cruise cont., rear fold-down seats, remote access, V6, \$12,000. 362-3358.

'94 FORD Mustang GT conv., 17" alloy wheels, V8, full pwr., very clean, \$10,800/obo. 768-1612.

'87 FORD Taurus LX, 76.8K mi., exc. cond., am/fm/cass., lthr., pwr. windows/seat, allow wheels, climt. cont., \$2,500. 310/391-2201.

'93 HONDA Civic, very clean, all records, low mi., 5-spd., black, \$7,250/obo. 952-7434.

'89 HONDA Accord LX, 4-dr., 5-speed, gold; new radiator, a/c, timing belt, brakes; good cond., runs smooth, 139K mi, \$4,200. 248-4637.

'81 HONDA Accord, auto, 4-dr., gd. shape, needs backseat cover, \$1,400. 790-0762.

'96 INFINITI Q45, loaded, auto, leather seats, like new, exc. cond., 42K mi., \$25,500/obo. 909/599-3230.

'91 INFINITI G20 sport sedan, 5 spd., 87K mi., leather interior, A/C, sunroof, cruise, cassette, excellent condition, well maintained, many extras, \$6,700. 626/288-5877.

'90 JEEP Cherokee Laredo, auto, 4x4+, 4.0 liter v-twin engine; remote auto door locks; pwr strg, win, abs breaks; privacy glass; a/c; am/fm/cass. w/prem. sound; spec rims, new tires + full spare; complete tow pkg; exc. cond., \$8,500. 951-9635 or 626/794-5196.

'96 MAZDA Protégé DX, 4-dr., burgundy, 5-spd., pwr. steering, a/c, exc. cond., 25K mi., \$10,000/obo. 626/564-8985 or 626/791-2434.

'95 MAZDA Miata, 5-spd., pw/s, BRS rims, am/fm/CD/stereo, Alpine amps, JL speakers, 42K

mi., \$12,250/obo. 504-6256.

'90 MAZDA MPV minivan, air, V6, full power, new tires, run great, minor body damage, 1 owner; \$4300. 957-5382.

'89 MAZDA MPV, gd. cond., much recent work, \$6,250/obo. 626/799-0109.

'88 MAZDA B-2200 truck, 90K on engine, 5-spd, new AM/FM/cass., tires, brakes, camper shell, all service records, \$1,700/obo. 626/798-8777.

'87 MAZDA RX7, GXL model, full equip'd, leather int., Kenwood AM/FM/CD stereo, lo blu. bk., \$2,500/obo. 626/797-6824.

'80 MERCEDES BENZ diesel, 4-dr., 5-spd., stereo, 160,000 mi., \$5,000/obo. 626/359-2827, Hugh or Gilrie.

'92 MITSUBISHI Eclipse, black, all pwr. equip., 5-spd., 16-valve DOHC eng., 83,000 mi., just smogged, priced below Blue Book at \$4,500. 249-6068.

'84 OLDSMOBILE Firenza, 4d, A/T, A/C, AM/FM cassette (new), 112K miles, good condition, \$1,575. 626/794-5035.

SAILBOAT, 13.5-ft. Firebird, great learning boat for youngsters, simple lateen sail system, foam-filled fiberglass hull with all aluminum fittings, easy to carry on car top, \$150. 626/791-5049.

'85 TOYOTA Supra, runs great, looks good, fun to drive; DOHC-6, 5-spd., AC, PW, PL, remote locks/alarms, power sun roof; \$2,900/make offer. 626/284-9424.

'77 VW van, camper conversion w/roll-back roof; bed, closet, sink & cupboard; hydraulic valve lifters, new alternator, battery, coil and front tires; minor body damage, needs some work; great project car; \$1,200/obo. 547-4539.

'72 VW, newer 1835cc eng., avg. cond., \$900 firm. 562/464-0446.

'70 VW Bug, rebuilt engine; new seats, chrome wheels, tires and battery; not running, needs wiring completed; tags and title current; \$950/obo. 626/309-0429.

WANTED

GARDENER recommendations for 7,500 sq. ft. yard in San Gabriel; mow, prune, plant, fertilize, etc. 626/284-9424.

HOUSEKEEPER/BABYSITTER for 3 eves./week; flexible days and salary. 790-4594.

HOUSE MANAGER(S) for 2 developmentally challenged young men, priv. home, rm./bd. developed. 626/797-6406, after 6 p.m.

MUSIC LOVER volunteers to join church's English choir in Monterey Pk.; sing 2-3 times a month at 10:30 mass; rehearsals Thurs at 7:30 p.m. 626/573-2564.

SPACE INFORMATION & memorabilia from U.S. & other countries, past & present. 790-8523, Marc Rayman.

TOY pieces or sets, "K'nex" and "Brio Mec". 626/ 303-3016, Eilyn.

VANPOOL RIDERS, stops along the 118, off-site contractors welcome, vanpool # 20. Ext. 4-0307, Marilyn.

FREE

BRICKS, CONCRETE BLOCKS. 626/351-5485.

CLEAN FILL DIRT [mostly gravel-like], you haul; several cu yds., take as little or as much as you like; 3 bks. ESE of NY & Hill, Altadena. 798-5152.

DOGS: 2 Queensland mix; siblings; 1-1/2 years old; one black and white spayed female with blue eyes, one brown and white male with brown eyes; med. to sm. sized family dogs w/very sweet personalities need loving home. 909/305-9922 after 6 p.m. and weekends, Cindy.

KITTENS, 2 @ 5 mo. old, (1 male, 1 female) to loving home, cute, smart, litterpan-trained. 626/357-2741.

PATIO PANELS, gd. cond., you haul. 626/573-2564, Mary.

FOR RENT

ALTADENA, furnished room in house, TV and cable in room, share ba., full house privileges including washer & dryer, pets okay, female preferred, \$350 including utilities. 626/798-2112.

ALTADENA house, 2 bd., 2 ba., bonus rooms & lrg garage; dsh-wshr., stove, fridg, w/d incl.; wtr, trash, grdnr incl., 5 min./JPL, \$1,300. 310/390-1807.

ALTADENA/RUBIO CYN. area, rm. in priv. residence, no smoking, no pets, \$350. 626/797-8082.

LA CANADA house, 4 bd. + den + 3 ba., pool, view, guest house, lg. lawn, 1,300 sq. ft. of entertainment/office area, \$4,400. 248-6949.

MONROVIA, share fully furn. condo, 2 bd., 1.75 ba., kitch. priv. incl. refrig, stove, dshwsh., wshr/dryr, cent. air/heat, \$400, util. pd. 626/375-5189.

MONTROSE apt., furn. rm., microw., refridg., priv. entr., \$350 + sec. dep. 249-0574.

MONTROSE townhouse, 2 bd., 2.5 ba., 3 miles/JPL, quiet sidestrt, newer complex, former model home, bright and airy, \$1,187. 248-5848, Robert.

PASADENA, 2 bd. + den/office, 3 ba. apt., cent. air/heat, sm. patio, laundry facil., \$1,100 + util. 626/351-9641.

SIERRA MADRE townhouse, roommate sought, 3 bd, 2.5 ba., nice neighborhood, laundry, garage, yd., \$425 to \$550. 626/836-9254.

SOUTH PASADENA, furn. studio apt. on 1 level, 1718 Huntington Dr. betw. Milan/Marengo; laundry facilities on premises, parking space; non-smoker; no pets; \$565, utilities pd. 626/792-9053, Marilyn.

REAL ESTATE

BIG BEAR, new cabin 2 blocks from lake, 2 bd., 2 bath, mud/laundry room, \$129,000. 909/585-9026.

LA CANADA house, 4 bd. + den + 3 ba., pool, view, guest house, lg. lawn, 1,300 sq. ft. of entertainment/office area, \$695,000. 248-6949.

LAKE CO., N. Calif., 2 1/2 acre lot, in beautiful Kelseyville near Clear Lake, perfect site for permanent or retirement home, 30 walnut trees, paved road, electricity, \$36,000. 626/337-7522.

MONTROSE townhouse, 2 bd., 2.5 ba., 3 miles/JPL, quiet sidestreet, newer complex, former model home, bright and airy, \$165,000. 248-5848, Robert.

PALM DESERT, exquisite 2 bd., 2 ba. villa, newly remodeled, w/skylight, patio & 2-car garage; located across Living Desert, great private, secure resort; tennis cts., multiple pools & spas, clubhouse facilities; great locality, around 2 top resorts. 909/620-1364.

PASADENA, 3 bd., 1.5 ba., hwd. flrs, cent. a/h, crown mld, frpl., liv. rm., din. rm., laundry rm., bonus rm., very charming, \$264,000. 626/798-9247.

PASADENA, spacious house, 3 bd. + den, 1-3/4 ba., detached 2-car garage, dead-end street, exc. for small kids; quiet, friendly neighborhood, walking dist. to lib., park & grocery, 10 min./JPL; next to Hastings Ranch; \$185,000/obo. 790-9275.

VACATION RENTALS

BIG BEAR, 7 mi. from slopes, full kitch., f/p, 2 bd., 1 ba., sleeps 6; reasonable rates; 2-night min., no smokers, no pets; exc. hiking, biking, fishing nearby. 909/585-9026, Pat & Mary Ann Carroll.

BIG BEAR cabin, quiet area near village, 2 bd., sleeps 8, completely furnished, F/P, TV/VCR, \$75/night. 249-8515.

BIG BEAR LAKE cabin, near lake, shops, village, forest trails, 2 bd., sleeps up to 6, fireplace, TV, VCR, phone, microwave, BBQ and more, JPL disc price from \$65/night. 909/599-5225.

BIG BEAR LAKEFRONT lux. townhome, 2 decks, sleeps 6, tennis, pool, spa. 949/786-6548.

BIG BEAR LAKEFRONT condo, 1 bd., 1 ba., sleeps 4, full kitchen, gym, indoor pool, Jacuzzi, BBQ areas, Oct. 16-23, \$75/night. 213/296-6641.

CAMBRIA, ocean front house, exc. view, sleeps up to 4, \$125/night for 2, \$175/per night for 4. 248-8853.

CATALINA house, 1 week (Sunday-Sunday) before April 1, '99, except Christmas and New Year's weeks; 5 bd. (sleeps 13), 2 ba.; great for multiple families or lots of friends; one of the best houses in Avalon; walking distance to everything; \$1,800. 845-1858, before Oct. 16.

CHARLESTON, S.C., house swap, Dec. 28-Jan. 2. 843/884-8402.

ESCONDIDO, Lawrence Welk, lg. 2-bd., 2-ba. condo, slps. 6, avail. Oct. 18-25, golf, tennis, pools, hot tubs, game/workout rms., \$600. 626/836-3931.

HAWAII, Kona, on 166 feet of ocean front on Keauhou Bay, private house and guest house comfortably sleep 6; 3 bd., 2 ba.; swimming, snorkeling, fishing, spectacular views, near restaurants, golf courses and other attractions. 626/584-9632.

HAWAII, Maui condo, NW coast, on beach w/ocean vw., 25 ft. fr. surf, 1 bd. w/loft, compl. furn., phone, color TV, VCR, microwave, dishwasher, pool, priv. lanai, slps. 4, 4/15-12/14 rate: \$95/nite/2, 12/15-4/14 rate: \$110/nite/2, \$10/nite/add'l person. 949/348-8047.

MAMMOTH condo, in Chamonix at lifts 7, 8, 16, 17; 2 bd., 2 ba., slps 6, fireplace w/wood, fully equip. elec. kitchen, microwave, TV, VCR, cable fm stereo, pool & sun area, outdoor Jacuz., sauna, game, rec., laundry rms., play & BBQ areas., conv. to hiking, shops; walk to lifts and Warming Hut, daily/weekly rates; summer rates through Oct. 249-8524.

MAMMOTH condo, 2 bd. + loft, 3 ba., slps. 8, spa, full kitchen, TV/VCR, JPL disc. rates; walk to Canyon Lodge. 249-8088.

MAMMOTH condo, slps. 5, summer rates \$50/nt., 5 or more nights \$40; shuttle stop nearby. 353-7839.

MAMMOTH, Snowcreek, 2 bd., 2 ba., + loft; sleeps 6-8; fully equipped kitch. incl. microwave, D/W; cable TV, VCR, phone; balcony w/mtn. view; Jacz., sauna; streams, fountains, close to Mammoth Creek; JPL discount. 626/798-9222 or 626/794-0455.

OCEANSIDE, on the sand, charming 1 bd. + condo, panoramic view, walk to pier/marina, pool, spa, game rm. 949/786-6548.

PALM DESERT, exquisite 2 bd., 2 ba. villa, newly remodeled, w/skylight, patio & 2-car gar.; located across Living Desert, great private, secure resort; tennis cts., multiple pools & spas, clubhouse facil.; great locality, around 2 top resorts. 909/620-1364.

ROSARITO BEACH condo, 2 bd., 2ba., ocean view, pool, tennis, short walk to beach on priv. rd., 18-hole golf course 6 mi. away, priv. secure parking. 626/794-3906.

SAN CLEMENTE COVE, 1-bd., 1-ba. condo, slps. 4, avail. Oct. 11-18, 1/2 blk./beach and pier; hot tub, game rm., \$500. 626/836-3931.

S. LAKE TAHOE Keys waterfront home, 4 bd., 3 ba., sleeps 12+, fireplace on 2 levels, decks overlook priv. dock/ski lifts, gourm. kitch., bikes, sail and paddle boats, 3 color TVs, VCR, stereo w/tape/disk, in/outdoor pools, hot tub and beach/tennis, 10 min./skiing, casinos/golf, 1 hr./wine country; \$995/wk. high season [15 June to 15 Sept. 22 Nov. to 1 March]; \$495/wk. low seas., + \$90 cleaning fee; 3-day min. 626/578-1503, Jim Douglas.

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Universe

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Mark Whalen

Photos

JPL Photo Lab

Universe is published every other Friday by the Public Affairs Office of the Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Drive, Pasadena, CA 91109.

Advertising is a free service offered only to JPL, Caltech and contractor employees, retirees and immediate families.

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